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ABSTRACT

Vision is so important to scholastic success that almost all states require by law some kind of vision testing of school children. The ideal visual screening program would involve the kind of test or tests a classroom teacher could administer and would be fast, thorough, and accurate. However, present commercial vision screening batteries fail to measure up to these criteria. The Snellen test is inadequate because of its very high underreferral rate, while the most popular screening test instruments, the Telebinocular and Ortho-Rater, have been criticized for over referring children to vision specialists. Unfortunately, the most superior vision screening method that can be used in schools--the Modified Clinical Technique--proves unfeasible because of the difficulty and cost of bringing a team of specialists to the school. What is needed is a simple screening test that would have the validity of the Modified Clinical Technique test at a fraction of its cost. (JM)

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THE STATUS OF VISUAL SCREENING IN TODAY'S SCHOOLS

(session: "Visual Screening--a New Breakthrough")

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THE STATUS OF VISUAL SCREENING IN TODAY'S SCHOOLS

It has been said that eighty percent of all learning involves vision. Vision is so important to scholastic success that almost all states require by law some kind of vision testing of school children.

Many children in our society are visually handicapped. In a study of 52,000 school children, Hamilton (5) found the mean percentage of those who manifested vsiaul problems was 21.4, ranging from 4.2 at age four to 36.7 at age 13. Another author estimated that about one-fourth to one-half of all elementary children are in need of visual corrections. (4)

Statistics such as the foregoing make it evident that it would be ideal if each and every child could be provided with a complete, competent professional eye examination at the time he or she enters school and periodically thereafter. Unfortunately, a program as complete and thorough as this would prove too expensive to be feasible. The answer lies in good visual screening. The ideal vision screening program would be fast, thorough, and accurate. It would not require a high degree of professional expertise and would involve the kind of test or tests that a classroom teacher might administer. At the present time, commercial vision screening batteries fail to measure up to these criteria.

Detecting Visual Defects

It all began in 1862 when a man named Herman Snellen designed a vision screening test that has come to be known as the Snellen

chart. The Snellen chart is the most widely used screening test in use today. It consists of letters of various sizes arranged in rows with the larger letters at the top and letters in each succeeding row smaller by a measurable amount. The size of each letter is computed upon the basis of the tangent of the 5′ angle at a given distance. Thus, the letter for 40 feet would be twice the size of the letter for 20 feet. However, at its appropriate distance each letter would subtend only 5′. Each arm of the letter would subtent 1′, the theoretical average minimum visual angle, and the spaces between each arm would also subtend 1′.

When the test is administered, the child stands 20 feet from the chart. He is then asked to read, without squinting, the lowest line possible. This is done with both eyes and then with each eye separately. Visual acuity is expressed as a fraction. The numerator is always the distance in feet that the child is from the chart and the denominator is the number beside the lowest line that he is able to read. If the child is 20 feet from the chart and is able to read only the 100 letter with the right eye, his visual acuity is recorded as 20/100. If he can read to the 30 line with the left eye, his acuity is recorded 20/30. Normal visual acuity is indicated when both numerator and denominator are the same, i. e., 20/20.

The Snellen test is easy to administer to a large group of children in a relatively short time but it is a test of distance acuity only. It overlooks many children in need of visual attention. It will screen out

children who are myopic (nearsighted), amblyopic (dimimg of vision without identifying cause), and those with severe amcunts of astigmatism or hyperopia (farsightedness). However, a child may have a considerable degree of hyperopia and yet have the ability to exert sufficient accommodative effort to bring the letters on the Snellen chart into focus. Other shortcomings of the Snellen test include its inability to detect any motor problems. Among these are position maintenance (fixation), saccades (movement of the eyes from one word or group of words to another), pursuit (following a moving object with the eyes), vergence (muscular imbalance), and compensatory eye movement resulting from head or body movements.

As might be suspected, the Snellen chart has a marked under-referral rate. And to complicate the situation, it is often given under conditions that are far from optimum. The chart may be soiled, lighting may be inadequate, there may be distractions in the environment, the child being tested may squint, memorize the chart, or intentionally cheat, and so on. (8)

Less widely used than the Snellen chart is the Massachusetts Vision Test. This test consists of three subtests: 1) A far point visual acuity test; 2) A plus lens test for detecting farsightedness; 3) A heterophoria test for both far point and near point. (11)

One of the more popular informal vision tests often employed in vision screening batteries is the cover test. This test is used to determine the presence of muscular imbalance of the two eyes both

at distance and near point. The individual being examined is told to fixate his gaze at a specific target, keeping both eyes open at all times. A card or similar object is placed before one eye by the examiner. After a period of three to five seconds the card is shifted quickly from the covered eye to the other eye. Any movement of the eye being uncovered is noted. The card should be shifted from one eye to the other several times to make certain of the presence or absence of eye movement of the eye being uncovered. If movement by an eye is noted when shifting the card, the presence but not the degree of fusion or binocularity may be determined by covering one eye 3 to 5 seconds (both eyes being open) and then removing the card. If the eye which turned when covered, returns to parallelism when both eyes are uncovered, it indicates that fusion or binocularity is present. (10)

Probably the most popular screening test instruments today are Telebinocular and Ortho-Rater. Both instruments use lenses. Sets of testing cards for these devices usually comprise of a series to measure binocular acuity, monocular acuity, vertical and lateral distance phorias, fusion, depth perception, near phorias, near fusion, and near acuity. Record forms on which to note the findings are available. Individual findings are checked either in or out of the expected columns. Thus, variations from a normal visual pattern can be indicated.

A screening program conducted by the Southern California College of Optometry at Fullerton, California employs the following tests which are essentially those of the Modified Clinical Technique. 1) Skiametry

(retinoscopy) to determine the refractive state of the eye; 2) Visual acuity using the illiterate E test; 3) Phoria tests at 20 feet and 16 inches to measure muscle imbalance or binocular coordination; 4) The cover test or objective and quantitative determination of binocular coordination; 5) Convergence and vision tests to determine ocular motility; 6) Internal (ophthalmoscopic) and external inspection for pathology or organic anomalies. (1) The Modified Clinical Technique is not administered by a teacher, a school nurse, or a doctor, but by a team of vision specialists who come directly to the school.

Screening Studies

The Orinda Study of Contra Costa County in California involved 1,221 elementary school children. Those children who failed the screening test were given a complete visual examination by an ophthalmologist and/or an optometrist. Coefficients of correlation between the two professions ranged from .84 to .96. After the data were gathered, several years were spent analyzing the results and readying a report for publication. The primary finding of the study was that the Modified Clinical Technique was superior to other methods of vision screening. (9)

The St. Louis Study involved an evaluation of 1200 children. Screening tests and criteria included the Massachusetts Vision Test, Snellen chart, Ortho-Rater, Telebinocular, and teacher judgment. Although the stereoscopic devices gave equal results, it was felt that they over referred. When compared with clinical examinations, the best methods missed more than a third of the children needing attention. The study concluded that the Snellen test used alone was as efficient as any of the other batteries of tests. (3) In this connection it

should be pointed out that the Snellen test "actually missed three times as many children really needing treatment as did any of the other three visual screening devices." (12) Why then was the Snellen test considered superior? Because it was based on the supposition that mistakenly referring children who do not need visual care is more reprehensible than failing to refer children who do need visual care.

The Toronto Study involved over 1200 children at a number of grade levels. It employed the Snellen test, Ortho-Rater, cover test, color testing, and cycloplegic refraction. Strangely, the study concluded that eye coordination problems short of tropias should receive minimal attention. (7)

The Shrewsbury Study evaluated 1,575 children in grades 1 through 12 by using the Massachusetts Vision Test. When a child failed the test, his parents were informed. About a third of the children given a complete evaluation by eye specialists were considered over referrals. (13)

The West Warwick Study concentrated on 3,621 children in grades K through 6. Six optometrists employed the technique advocated by the Orinda Study and added ophthalmometry and visual skills testing. The latter was done through the use of the Telebinocular. Referral rates ranged from 18 to 31 percent. Optometric acceptance and agreement of these referrals ranged from 80.5 percent to 100 percent. Ophthalmologic acceptance and agreement of the referrals ranged from 51.3 percent to 88 percent. The highest degree of acceptance and agreement between the two professions was found in grades 2, 3, 4 and 5; the lowest, in K and grade 1. (2)

What is Needed

We know that the most superior vision screening method that can be used in today's schools is the Modified Clinical Technique. Unfortunately, the MCT proves unfeasible because of the difficulty and cost of bringing a team of specialists to the school. The Southern California College of Optometry, for example, charges approximately $1.00 per child for screening.

The Snellen test is grossly inadequate as a screening test because of its very high under referral rate. On the other hand, devices such as the Telebinocular and Ortho-Rater have been criticized for over referring children to vision specialists.

In summary, there is no wholly satisfactory vision screening program in current use in our schools. What is needed is a simple screening test that would have the validity of the Modified Clinical Technique at a fraction of its cost. Dr. Walton, a professor at the Southern California College of Optometry, will now tell us about such a test.

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